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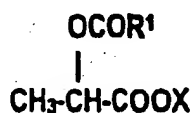
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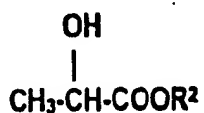
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(54) Utilization of Lactic Acid Esters as Conditioners in Skin and Hair Care Products

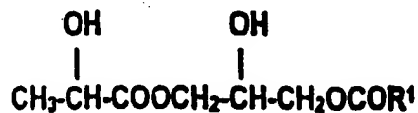
(57) The use of lactic acid esters having formulas (Ia), (Ib), and/or (Ic) for manufacturing conditioners is proposed,



(Ia)



(Ib)



(Ic)

where R<sup>1</sup>CO stands for a linear or branched, saturated and/or unsaturated acyl residue having 6 to 22 carbon atoms, R<sup>2</sup> stands for an alkyl and/or alkenyl residue having 6 to 22 carbon atoms, and X stands for an alkali and/or alkaline earth metal. The lactic acid esters improve the sensory characteristics of skin and hair.

(Ia) in which the acyl residue  $R^1CO$  is derived from fatty acids with 16 to 22 carbon atoms, such as, for example, sodium stearyl lactate.

Aside from esters obtained by acylation of the lactic acid's hydroxyl group, esters having the formula (Ib) and products of the esterification of the lactic acid with caproic alcohol, caprylic alcohol, 2-ethylhexyl alcohol, capric alcohol, lauryl alcohol, isotridecyl alcohol, myristyl alcohol, cetyl alcohol, palm[it]oleyl alcohol, stearyl alcohol, isostearyl alcohol, oleyl alcohol, elaidyl alcohol, petroselinyl alcohol, linolyl alcohol, linolenyl alcohol, eleostearyl alcohol, arachyl alcohol, gadoleyl alcohol, behenyl alcohol, erucyl alcohol, and brassidyl alcohol, and their technical mixtures. Preference is given to the utilization of lactic acid esters with formula (Ib) in which the alkyl residue  $R^2$  is derived from fatty alcohols having 16 to 22 carbon atoms, such as, for example, lactic acid stearyl ester.

The third possible group of lactic acid esters are partial glycerides having formula (Ic), which are obtained, for example, by esterification of the lactic acid with technical partial glycerides.

Technical mixtures usually result from this process which may contain estolides and lactides - and the same is true with the esters having formulas (Ia) or (Ib). The partial glycerides, in turn, may be mono- and/or diesters of the glycerin with fatty acids having 6 to 22 and preferably 12 to 18 carbon atoms.

The common feature shared by all these types of esters is that in an especially preferred embodiment of the invention, they exhibit a degree of esterification ranging from 50 to 90 and preferably 60 to 80%. The lactic acid esters may be utilized in the process in quantities of 1 to 10, preferably 3 to 7% by weight - referring to the preparations.

#### **Suitability for Commercial Applications**

The lactic acid esters may, according to the invention, be utilized to manufacture skin and hair care products in combination with additional adjuvants and ingredients such as, for example, mild tensides, oleaginous bodies, emulsifiers, super-fatting agents, stabilizers, waxes, consistency builders, thickeners, cation polymers, silicone compounds, biogenic active ingredients, dandruff-fighting agents, film builders, preservatives, hydrotropes, solubilizers, UV light filters, insect repellents, self-tanning agents, colorants and aromas, and the like.

Typical examples of suitable mild tensides, i.e. those particularly well tolerated by skin, are fatty alcohol polyglycol ether sulfates, monoglyceride sulfates, mono- and/or dialkyl sulfosuccinates, fatty acid glucuronates, fatty acid sarcosinates, fatty acid taurides, fatty acid glutamates, ether carboxylic acids, alkyl oligoglucosides, fatty acid glucamides, alkyl amidobetaines, and/or protein fatty acid condensates, the latter preferably with a wheat protein base.

Possible oleaginous bodies are, for example, guer beta alcohols with a basis of fatty alcohols having 6 to 18, preferably 8 to 10 carbon atoms, esters of linear  $C_6-C_{22}$  fatty acids with linear  $C_6-C_{22}$  fatty alcohols, esters of branched  $C_6-C_{13}$  carboxylic acids with linear  $C_6-C_{22}$  fatty alcohols, esters of linear  $C_6-C_{22}$  fatty acids with branched alcohols, especially 2-ethylhexanol, esters of linear and/or branched fatty acids with polyvalent alcohols (such as, e.g., propylene glycol, dimeric diol, or trimeric triol) and/or guer beta alcohols, triglycerides with a  $C_6-C_{10}$  fatty acid basis, esters of  $C_6-C_{22}$  fatty alcohols, and/or guer beta alcohols with aromatic carboxylic acids, especially benzoic acid, vegetable oils, branched primary alcohols, substituted cyclohexanes, linear  $C_6-C_{22}$  fatty alcohol carbonates, guer beta carbonates, dialkyl ether, ring opening products of fatty acid esters epoxidized with polyols, silicone oils, and/or aliphatic or naphthenic hydrocarbons.

Possible emulsifiers are, for example, non-ionogenic tensides from at least one of the following groups:

- (1) Addition reaction products of 2 to 30 Mol ethylene oxide and/or 0 to 5 Mol propylene oxide on linear fatty alcohols with 8 to 22 carbon atoms, on fatty acids with 12 to 22 carbon atoms, and on alkyl phenols with 8 to 15 carbon atoms in the alkyl group;
- (2)  $C_{12/18}$  fatty acid mono- and diesters of addition reaction products of 1 to 30 Mol ethylene oxide on glycerin;
- (3) Glycerin mono- and diesters and sorbitane mono- and diesters of saturated and unsaturated fatty acids with 6 to 22 carbon atoms and their ethylene oxide addition reaction products;
- (4) Alkylmono- and oligoglycosides with 8 to 22 carbon atoms in the alkyl residue and their ethoxylated analogs;
- (5) Addition reaction products of 15 to 60 Mol ethylene oxide on dehydrated castor oil and/or hardened dehydrated castor oil;
- (6) Polyol esters and particularly polyglycerin esters such as, e.g., polyglycerin polyricinoleate or polyglycerin poly-12-hydroxystearate. Likewise suitable are mixtures of compounds made up of more than one of these substance categories;
- (7) Addition reaction products of 2 to 15 Mol ethylene oxide on dehydrated castor oil and/or hardened dehydrated castor oil;
- (8) Partial esters based on linear, branched, unsaturated, or saturated  $C_{6/22}$  fatty acids, ricinoleic acid, or 12-hydroxystearic acid and glycerin, polyglycerin, penta-erythrite, dipenta-erythrite, sugar alcohols (e.g. sorbite), alkyl glucosides (e.g. methyl glucoside, butyl glucoside, lauryl glucoside), and polyglucosides (e.g. cellulose);
- (9) Trialkyl phosphates and mono-, di-, and/or tri-PEG-alkyl phosphates;
- (10) Lanolin alcohols;
- (11) Polysiloxane-polyalkyl-polyether-copolymers and corresponding derivatives;
- (12) Mixed esters of penta-erythrite, fatty acids, citric acid, and fatty alcohol according to German Patent 1165574 and/or mixed esters of fatty acids with 6 to 22 carbon atoms, methyl glucose, and polyols, preferably glycerin, and
- (13) Polyalkylene glycols.

The addition reaction products of ethylene oxide and/or propylene oxide on fatty alcohols, fatty acids, alkyl phenols, glycerin mono- and diesters, and sorbitane mono- and diesters of fatty acids or on dehydrated castor oil represent known, commercially available products. What they are is mixtures of homologs with average degrees of alkoxylation that correspond to the proportion of substance quantities of ethylene oxide and/or propylene oxide and substrate used in conducting the addition reaction.  $C_{12/18}$  fatty acid mono- and diesters of addition reaction products of ethylene oxide on glycerin are known from German Patent 20 24 051 as conditioners for cosmetic preparations.

$C_{8/18}$  alkylmono- and oligoglycosides, their manufacture and utilization as surface-active substances are, for example, known from US 3,839,318, US 3,707,535, US 3,547,828, German published patent applications 19 43 689 and 20 36 472, German application A1 30 01 064, and European Patent A 0 077 167. They are manufactured especially by allowing glucose or oligosaccharides to react with primary alcohols having 8 to 18 carbon atoms. Regarding the glycoside residue, it holds true that both monoglycosides where a cyclic sugar residue is

glycosidically bonded to the fatty alcohol and oligomeric glycosides where the degree of oligomerization is preferably up to approximately 8 are suitable. The degree of oligomerization in this context is a statistical mean based on the distribution of homologs that is customary in such technical products.

In addition, tensides with amphoteric ions can also be used as emulsifiers. The term "tensides with amphoteric ions" is used to designate surface-active compounds bearing within the molecule at least one quaternary ammonium group and at least one carboxylate and one sulfonate group. Especially well-suited as tensides with amphoteric ions are the so-called betaines like the N-alkyl-N,N-dimethylammonium glycinate, for example cocinic alkyl dimethylammonium glycinate, N-acylaminoethyl-N,N-dimethylammonium glycinate, for example cocinic acylaminoethyl dimethylammonium glycinate and 2-alkyl-3-carboxymethyl-3-hydroxyethylimidazolines, each having 8 to 18 carbon atoms in the alkyl or acyl group, as well as cocinic acylaminoethyl hydroxyethyl carboxymethyl glycinate. Especially preferred is the known fatty acid amide derivative known by the CTFA designation *Cocamidopropyl Betaine*. Likewise suitable as emulsifiers are ampholytic tensides. The term ampholytic tensides refers to surface-active compounds having not only a C<sub>8/18</sub> alkyl or acyl group within the molecule but also at least one free amino group and at least one -COOH- or -SO<sub>3</sub>H-group and the ability to form internal salts. Some examples of ampholytic tensides are N-alkyl glycines, N-alkyl propionic acids, N-alkylamino butyric acids, N-alkyliminodipropionic acids, N-hydroxyethyl-N-alkylamidopropyl glycines, N-alkyltaurines, N-alkylsarcosines, 2-alkylaminopropionic acids, and alkylamino acetic acids, each with approximately 8 to 18 carbon atoms in the alkyl group. Especially preferred ampholytic tensides are N-cocinic alkylamino propionate, cocinic acylaminoethylamino propionate, and C<sub>12/18</sub>-acylsarcosine. In addition to ampholytic emulsifiers, quaternary emulsifiers may also be used, with special preference given to those of the esterquat type, preferably methyl quaternized di-fatty acid triethanolamine ester salts.

Other possible super-fattening agents that can be used include substances such as, e.g., lanolin and lecithin, along with polyethoxylated or acylated lanolin and lecithin derivatives, polyol fatty acid esters, monoglycerides, and fatty acid alkanolamides, whereby the latter simultaneously serve as foam stabilizers. The main consistency builders that qualify for use are primarily fatty alcohols with 12 to 22 and preferably 16 to 18 carbon atoms or, alternatively, partial glycerides. Preference is given to a combination of these substances with alkyl oligoglucosides and/or fatty acid-N-methylglucamides with equally long chain length and/or polyglycerinpoly-12-hydroxystearates. Examples of suitable thickeners are polysaccharides, especially xanthan gum, guar-guar, agar-agar, alginates, and tyloses, carboxymethylcellulose, and hydroxyethylcellulose, and also higher molecular polyethylene glycol mono- and diesters of fatty acids, polyacrylates (e.g. Carbopole® from Goodrich or Synthalene® from Sigma), polyacrylamides, polyvinyl alcohol, and polyvinyl pyrrolidone, tensides such as, for example, ethoxylated fatty acid glycerides, esters of fatty acids with polyols such as, for example, penta-erythrite or trimethylolpropane, fatty alcohol ethoxylates with restricted homolog distribution or alkyl oligoglucosides and electrolytes like table salt and ammonium chloride.

Suitable cationic polymers are, for example, cationic cellulose derivatives such as, for example, a quaternized hydroxyethylcellulose marketed under the name of Polymer JR 400® from Amerchol, cationic starch, copolymers of diallylammonium salts and acrylamides, quaternized vinylpyrrolidone/vinyl-imidazol polymers such as, for example, Luviquat® (BASF), condensation products of polyglycols and amines, quaternized collagen polypeptides such as, for example, lauryldimonium hydroxypropyl hydrolyzed collagen (Lamequat® L/Grünau), quaternized wheat polypeptides, polyethylene imine, cationic silicone polymers such as, for example, amidomethicones, copolymers of adipic acid and dimethylaminohydroxypropyldiethylenetriamine (Cartaretine®/Sandoz), copolymers of acrylic acid with dimethyldiallylammonium chloride (Merquat® 550/Chemviron), polyaminopolyamides such as, for example, are described in FR-A 22 52 840 and their cross-linked water soluble polymers, cationic chitin derivatives such as, for example, quaternized chitosane, possibly distributed as microcrystals, condensation products from dihalogenalkylene such as, for example, dibromobutane with bisdialkylamines such as, for example, bis-dimethylamino-1,3-propane, cationic guar gum such as, for example, Jaguar® CBS, Jaguar® C-17, Jaguar® C-16 by Celanese, quaternized ammonium salt polymers such as, for example, Mirapol® A-15, Mirapol® AD-1, Mirapol® AZ-1 by Miranol.

Suitable silicone compounds are, for example, dimethylpolysiloxanes, methyl-phenylpolysiloxanes, cyclical silicones as well as amino-, fatty acid-, alcohol-, polyether-, epoxy-, fluoro-, glucoside-, and/or alkyl-modified

silicone compounds which at room temperature may be present in either liquid or resin form. Typical examples for fats are glycerides, while possible waxes include, among other things, beeswax, carnauba wax, candelilla wax, montan wax, paraffin wax, or micro-waxes, possibly in combination with hydrophilic waxes, e.g. cetylstearyl alcohol or partial glycerides. Especially suitable for use as pearly luster waxes are mono- and difatty acid esters of polyalkylene glycols, partial glycerides, or esters of fatty alcohols with polyvalent carboxylic acids or hydroxycarboxylic acids. Metallic salts of fatty acids such as, for example, magnesium, aluminum, and/or zinc stearate can be used as stabilizers. Biogenic active ingredients are understood to be, for example, tocopherol, tocopherol acetate, tocopherol palmitate, ascorbic acid, retinol, bisabolol, allantoin, phytantriol, panthenol, AHA acids, plant extracts, and vitamin complexes. Climbazol, octopirox, and zinc pyrethion can be utilized as agents to combat dandruff. Commonly used film building agents are, for example, chitosan, micro-crystalline chitosan, quaternized chitosan, polyvinyl pyrrolidone, vinyl-pyrrolidone-vinyl acetate copolymers, polymers of the acrylic acid series, quaternary cellulose derivatives, collagen, hyaluronic acid and their salts, and other similar compounds.

UV light filters are understood to be organic substances with the ability to absorb ultraviolet rays and release the absorbed energy as rays having a longer wavelength, e.g. heat. Typical examples include 4-aminobenzoic acid and its esters and derivatives (e.g. 2-ethylhexyl-p-dimethylaminobenzoate or p-dimethylaminobenzoic acid octylester), methoxy cinnamic acid and its derivatives (e.g. 4-methoxy cinnamic acid-2-ethylhexyl ester), benzophenones (e.g. oxybenzone, 2-hydroxy-4-methoxybenzophenone), dibenzoylmethanes, salicylate esters, 2-phenylbenzimidazol-5-sulfonic acid, 1-(4-tert. Butylphenyl)-3-(4'-methoxyphenyl)-propane-1,3-dione, 3-(4'-methyl)benzylidene bornane-2-one, methylbenzylidene camphor, and the like. Finely disperse metal oxides or salts can also be used for this purpose, such as, for example, titanium dioxide, zinc oxide, iron oxide, aluminum oxide, cerioxide, zirconium oxide, silicates (talc) and barium sulfate, whereby the mean diameter should be less than 100 nm, preferably between 5 and 50 nm, and especially between 15 and 30 nm. They may be spherical in shape, but particles can also be used which are ellipsoid or have some other shape that deviates from the spherical. In addition to the two aforementioned groups of primary light filtering substances, secondary light filtering substances of the antioxidant variety can also be used which interrupt the photochemical reaction chain that is triggered when UV radiation penetrates the skin. Typical examples of this type are superoxide dismutases, tocopherols (vitamin E), and ascorbic acid (vitamin C).

In addition, hydrotropics such as, for example, ethanol, isopropyl alcohol, or polyols can also be used to improve flow properties. Polyols that qualify for this purpose preferably have 2 to 15 carbon atoms and at least 2 hydroxyl groups. Typical examples include:

- **Glycerin;**
- Alkylene glycols such as, for example, ethylene glycol, diethylene glycol, propylene glycol, butylene glycol, hexylene glycol, and polyethylene glycols with a mean molecular weight from 100 to 1,000 Dalton;
- Technical oligoglycerin mixtures with an inherent condensation degree of 1.5 to 10, such as, for example, technical diglycerin mixtures with a diglycerin content of 40 to 50 percent by weight;
- Methy[l]ol compounds, such as, particularly, trimethylol ethane, trimethylol propane, trimethylol butane, penta-erythrite, and dipenta-erythrite;
- Low alkylglucosides, especially those with 1 to 8 carbon atoms in the alkyl residue, such as, for example, methyl- and butylglucoside;
- Sugar alcohols with 5 to 12 carbon atoms, such as, for example, sorbitol or mannite;
- Sugars with 5 to 12 carbon atoms, such as, for example, glucose or saccharose;
- Amino sugars such as, for example, glucamine.

Suitable as preservatives are, for example, phenoxyethanol, formaldehyde solution, parabens, pentane diol, or sorbic acid. Suitable insect repellents include N,N-diethyl-m-toulamide, 1,2-pentane diol, or Insect repellent 3535, and a suitable self-tanning agent is dihydroxyacetone. Colorants that can be used include substances that

are suitable and have been approved for cosmetic purposes, such as, for example, those listed in the publication "Kosmetische Farbmittel" [Cosmetic Colorants] put out by the Commission on Colorants of the "Deutsche Forschungsgemeinschaft" in the Verlag Chemie [publishing house], Weinheim, 1984, pp 81-106. These colorants are usually used at concentrations of 0.001 to 0.1 percent by weight relative to the entire mixture.

The total share of adjuvants and additives can equal 1 to 50, preferably 5 to 40 percent by weight relative to the preparation. The usual cold or hot processes can be used to manufacture the preparations; the phase inversion method is preferred.

### Examples

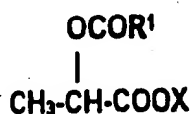
Conditioning properties were studied in terms of how difficult it was to comb wet strands of hair treated with lactic acid esters. Before undertaking the baseline measurement, a medium was used to bleach the strands blond. The medium was allowed to work for 5 minutes before the test formulations (1g/1g of hair) were used to rinse for 1 minute under standardized conditions (38°C, 1 L/min). Measurements were performed on 20 strands of hair. The results are summarized in Table 1:

Table 1:

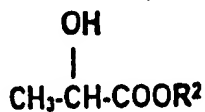
Wet combing measurements (quantities are given in percent by weight)						
Ingredients/Performance	1	2	3	4	5	6
Sodium laureth sulfates	15.0					
Sodium caproyl lactylate	5.0	-	-	-	-	-
Sodium lauroyl lactylate	-	5.0	-	-	-	-
Sodium cocoyl lactylate	-	-	5.0	-	-	-
Sodium stearyl lactylate	-	-	-	5.0	-	-
Sodium stearyl lactylate	-	-	-	-	5.0	-
Sodium stearyl lactylate	-	-	-	-	-	5.0
Water	to 100					
Degree of esterification, lactic acid ester	18	36	24	34	67	75
Wet combing, before (mJ)	67.7	65.1	60.0	60.3	62.4	63.5
Wet combing, after (mJ)	57.1	61.7	57.5	53.7	37.3	41.0
Remainder (%)	84	95	96	89	60	65

### Patent Claims

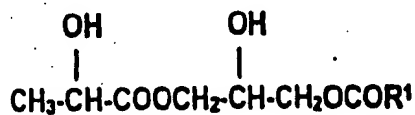
- Utilization of lactic acid esters having formulas (Ia), (Ib), and/or (Ic),



(Ia)



(Ib)



(Ic)

where  $R^1CO$  stands for a linear or branched, saturated and/or unsaturated acyl residue with 6 to 22 carbon atoms,  $R^2$  stands for an alkyl and/or alkenyl residue with 6 to 22 carbon atoms, and X stands for an alkali and/or earth alkaline metal, as a conditioner for manufacturing skin and hair care products.

2. Utilization according to claim 1, characterized by the fact that one uses lactic acid esters having formula (Ia), in which the acyl residue  $R^1CO$  is derived from fatty acids having 16 to 22 carbon atoms.
3. Utilization according to claims 1 and 2, characterized by the fact that one uses lactic acid esters having formula (Ib), in which the alkyl residue  $R^2$  is derived from fatty alcohols having 16 to 22 carbon atoms.
4. Utilization according to claims 1 through 3, characterized by the fact that one uses lactic acid esters with a degree of esterification ranging from 50 to 90%.